REMARKS

Claims 1-17 are pending in the present application. Claims 1, 2, 4 and 10 have been amended.

Claim Rejections-35 U.S.C. 103

Claims 1-3 and 5-17 have been rejected under 35 U.S.C. 103 as being unpatentable over the Okamoto reference (U.S. Patent No. 5,298,093) in view of SU 1148893 (abstract), and the Corwin reference (U.S. Patent No. 4,735,771) or WO 01/57280. This rejection is respectfully traversed for the following reasons.

As emphasized in the Request for Reconsideration dated February 11, 2009, the present invention defines a pitting resistance equivalent (PREW) by the following formula as set forth on page 14, line 21 of the present application:

PREW = wt%Cr + 3.3(wt%Mo + 0.5wt%W) + **30**wt%N.

Okamoto on the other hand defines a pitting resistance equivalent (PREW) by the following formula as indicated in the Abstract thereof:

PREW* = wt%Cr + 3.3(wt%Mo + 0.5wt%W) + **16**wt%N.

In the Response to Arguments section on page 5 of the Final Office Action dated May 13, 2009, the Examiner has stated the following responsive to the above noted arguments regarding pitting resistance equivalent (PREW):

"But rejected claims 1 and 4, for examples, merely require to satisfy said formula and applicants fail to show that claimed formula has not been

satisfied by duplex stainless steel of Okamoto".

However, contrary to the Examiner's above noted assertion in the Final Office Action dated May 13, 2009, Applicants did indeed address how the stainless steel of the present application as featured in claim 1 provides a duplex stainless steel that distinguishes over the prior art stainless steel. The comments as presented in the Request for Reconsideration dated February 11, 2009, which address how the duplex stainless steel having the defined pitting resistance equivalent (PREW) of claim 1 distinguishes over the prior art, are reproduced as follows:

"Enclosed herewith is a Table including PREW* (= PREW - 16wt%N) (hereinafter, PREW* means Okamoto-type pitting resistance equivalent) which has been extracted and conversed in part from Tables 1 and 2 of the present application.

From the above, it should be understood that the contents of Cr, Mo, W and N are very critical for improving pitting resistance of the duplex stainless steel, but that Cr, Mo and W are major elements of the intermetallic phases such as sigma and khi phases.

In this regard, the present invention is directed to actively suppressing the intermetallic phases by adding additional elements together with increasing PREW values, i.e., increasing Cr, Mo, W and N. The results thereof will be concisely explained in the latter stages of this response.....

In the present application, several examples are presented in the specification and drawings showing that the present duplex stainless steel has an excellent corrosion resistance, embrittlement resistance, castability and hot workability, due to much suppressed formation of intermetallic phases.

Firstly, as all the corrosion tests such as the anodic polarization test, the critical pitting temperature (CPT) test and the critical crevice corrosion temperature (CCCT) test follow the condition specified by the ASTM (American Society for Testing and Materials) (refer to page 21, lines 4 – 8 of the present application), it is very easy to compare the present duplex stainless steel with the conventional (commercial) steels.

In Example 2 as described beginning on page 21 of the present application, Figs. 1A to 1F are pictures of microstructures showing precipitation of brittle intermetallic phases after aging heat-treated at 850°C for 30 minutes, and shows that the invention steels 4 (PREW* = 46.4), 10 (PREW* = 45.56) and 36 (PREW* = 47.34) have suppressed precipitation of the intermetallic phases more than commercial PREW 46-level duplex stainless steels UR 52+ (PREW* = 41.7) and SAF 2507 (PREW* = 41.86), to improve embrittlement resistance. That is, it is possible to increase PREW* compared to the commercial steels without producing the intermetallic

phases. Example 3 also shows similar results.

Example 5 as described beginning at the bottom of page 22 of the present application, shows anodic polarization test (pitting resistance) results of invention steels in a cast state, compared to comparative steel in a cast state (refer to Fig. 4 and Example 5). Example 6 shows results of CCT and CCCT values of solution heat-treated steels, Example 7 shows results of anodic polarization test of solution heat-treated steels, and Example 8 shows results of anodic polarization test of aging heat-treated steels, in which the invention steels has shown higher pitting resistance than commercial high-grade duplex stainless steel UR 52N+, SAF 2507 and ZERON 100 and higher corrosion resistance than commercial high grade austenitic stainless steels AL-6XN, SR-50A and 254 SMO. Generally speaking, the austenitic stainless steel has superior corrosion resistance to the duplex stainless steel, but the austenitic stainless steel necessarily contains much more amounts of Ni, which is a very expensive alloying element, and thus is very expensive compared to the duplex stainless steel. Despite this, the invention steel shows superior corrosion resistance to the austenitic stainless steels as well as to the commercial duplex stainless steels.

The more detailed examples have been presented in Table 2, which

shows that the invention steels had much higher CPT and CCCT than comparative and commercial steels (refer to Figs. 5, 6A, 6B, 7A and 7B, Table 2 and Examples 6, 7 and 8).

With regard to pitting resistances of the present invention as compared with those in the Okamoto reference, in the Okamoto reference the highest PREW* value is 47.1 at steel No. 7 in Table 2 of the Okamoto reference. In contrast, in accordance with the present invention, several examples are realized such as 9, 12, 13, 20, 22, 23, 26, 28, 29, 30, 31, 32, 34, 35, 36, 38, 39, 40 and 42, of which the PREW* values are above 47.1, as shown in the enclosed Table.

That is, in accordance with the present invention, PREW* value is increased without a danger of producing intermetallic phases, and thus superior pitting resistance to the Okamoto reference is realized as follows.

Even though the Okamoto reference shows pitting potential results (mV vs SCE) measured in an aqueous <u>20% NaCl solution at 80°C</u> in Table 2 (refer to Col. 8, lines 54 – 60; Table 2 of the Okamoto reference) and the present invention shows pitting potentional results (mV vs SCE) measured in a much severe environment of <u>0.5N HCl + 1.0N NaCl solution at 50 and 70°C</u> in Table 2 (refer to page 21, lines 4 – 8; Table 2 of present application), the steels according to the present invention show superior pitting

potential to those of the Okamoto reference, because the meaning of "2)" in Table 2 indicates "Above equilibrium oxygen evolution potential: No pitting generated", which is above 858 mV vs SCE. In the Okamoto reference, only one specimen (steel No. 7) is similar with respect to pitting potential (850 mV vs SCE) to those of present invention.

That is, in the present invention, due to the additionally added Ba (Claim 1) and MM and/or Y (Claim 4), which can actively suppress the intermetallic phases, the PREW* values or contents of Cr, Mo and W can be increased without a danger of the formation of intermetallic phases such as sigma and khi."

Accordingly, the Examiner's assertion that Applicants have failed to show that the claimed formula has not been satisfied by the duplex stainless steel is clearly wrong.

Applicants respectfully emphasize that claim 1 features a pitting resistance equivalence PREW = wt%Cr + 3.3(wt%Mo + 0.5wt%W) + **30**wt%N, while in contrast the Okamoto reference discloses a pitting resistance equivalence PREW* = wt%Cr + 3.3(wt%Mo + 0.5wt%W) + **16**wt%N. Clearly, the relied upon prior art, particularly the Okamoto reference, does not meet the features of claim 1. The Examiner has failed to establish on the record how the relied upon prior art can be interpreted to meet or make obvious these above noted features.

Accordingly, Applicants respectfully submit that the high-grade duplex stainless

steel of claim 1 would not have been obvious in view of the prior art as relied upon by the Examiner taken singularly or together, and that this rejection of claims 1-3 and 5-17 is improper for at least the above reasons, in addition to the reasons set forth in the Request for Reconsideration dated February 11, 2009.

Claims 4-17 have been rejected under 35 U.S.C. 103(a) as being unpatentable over the Okamoto reference. This rejection, insofar as it may pertain to the presently pending claims, is traversed for the following reasons.

Applicants respectfully emphasize that claim 4 features a pitting resistance equivalence PREW = wt%Cr + 3.3(wt%Mo + 0.5wt%W) + **30**wt%N, while in contrast the Okamoto reference discloses a pitting resistance equivalence PREW* = wt%Cr + 3.3(wt%Mo + 0.5wt%W) + **16**wt%N. Clearly, the Okamoto reference does not meet the features of claim 1. The Examiner has failed to establish on the record how the relied upon prior art can be interpreted to meet or make obvious these above noted features.

Moreover, the Okamoto reference as relied upon does not disclose MM which is total weight of Ce, La, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, and Sc, as would be necessary to meet the further features of claim 4.

Accordingly, Applicants respectfully submit that the high-grade duplex stainless steel of claim 4 would not have been obvious in view of the prior art as relied upon by the Examiner, and that this rejection, insofar as it may pertain to claims 4-17, is improper for at least the above reasons, in addition to the reasons set forth in the Request for Reconsideration dated February 11, 2009.

Conclusion

The Examiner is respectfully requested to reconsider and withdraw the corresponding rejections, and to pass the claims of the present application to issue, for at least the above reasons.

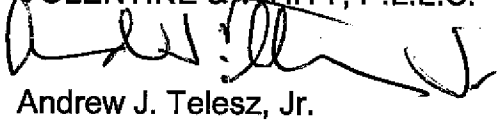
In the event that there are any outstanding matters remaining in the present application, please contact Andrew J. Telesz, Jr. (Reg. No. 33,581) at (571) 283-0720 in the Washington, D.C. area, to discuss these matters.

Pursuant to the provisions of 37 C.F.R. 1.17 and 1.136(a), the Applicants hereby petition for an extension of three (3) months to January 13, 2010, for the period in which to file a response subsequent the Notice of Appeal. The required fee of $555.00 should be charged to Deposit Account No. 50-0238.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment for any additional fees that may be required, or credit any overpayment, to Deposit Account No. 50-0238.

Respectfully submitted,

VOLENTINE & WHITT, P.L.L.C.



Andrew J. Telesz, Jr.
Registration No. 33,581

One Freedom Square
11951 Freedom Drive, Suite 1260
Reston, Virginia 20190
Telephone No.: (571) 283-0720
Facsimile No.: (571) 283-0740